

Use of No-Fly Zones to Increase Safety and Reliability with Overhead Cranes

In many heavy industries, overhead bridge cranes are a common tool of the trade. Throughout the years, overhead cranes have also been referred to as "EOT" cranes, which stands for Electrified Overhead Traveling Crane. These cranes come in different configurations, but what is common is that each crane commonly has one or more trolley hoists mounted.



In low overhead situations, the hoist can interfere with structures or equipment on the factory floor under the crane runway. Other situations exist in which a die may need to be transported through the facility and needs a clear path so that collisions will not occur. No-fly zone systems add to a company's safety program.

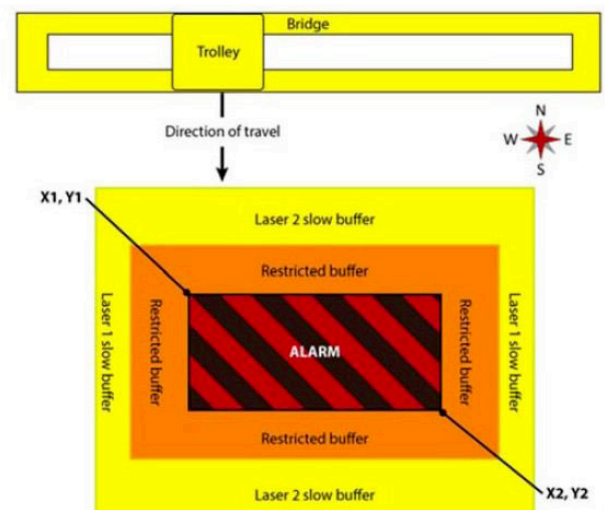
Definition of No-Fly Zones

A no-fly zone is an area in which you wish to prohibit overhead crane movement. This area can be designated in several ways:

- ⌚ Prohibit movement of trolley hoist
- ⌚ Prohibit movement of bridge only
- ⌚ Force slow speed only while in the zone either during all operation or only when in override mode

What kind of obstacles warrant no-fly zones?

- ⌚ Buildings/structures within the crane runway
- ⌚ Equipment, such as stamping presses, CNC machine centers, or injection molding presses
- ⌚ Areas with high material handling traffic below, such as main forklift aisles
- ⌚ Other crane systems, such as modular self-standing cranes under the main runway
- ⌚ Jib cranes for machine tending



NO-FLY ZONE

Overview

No-Fly Zones are More Important Now Than Ever Before

As crane controls have migrated from pendent to wireless radio type controls, the frequency and probability of collisions between a crane and obstacles have increased. This is because the crane operator no longer must walk with the crane. In some cases, operators can mistakenly operate a different crane than intended. Too often, he or she realizes this after it is too late.

Even the most experienced operator can easily become distracted during a crucial part of a lift and miscalculate the position of the crane. If complacency kicks in and an operator does not feel the need to operate slowly around an obstacle, a lift can go wrong once the load shifts unexpectedly. Laser-View Technologies has witnessed more than once what happens after a crane loaded with steel coil plows through an office or operator console. In the case referred to, the operator console/office has existed since the facility opened!

Methods of Restricting Overhead Crane Movement in No-Fly Zones

Traditionally, no-fly zones have been handled using mechanical limit switches. These switches, often referred to as “windmill” switches, are mounted to the bridge or trolley and fixed levers flip the positions.

The limit switches must be tied into a common controller to provide the relay logic for the forward, reverse, and speed signals to the bridge and trolley drives. Adjustment is not easy, since any position adjustment must be made mechanically by remounting and repositioning the trip arm. In addition, two switches are needed to obtain slow and stop conditions on each of the four sides of the zone.



Non-contact methods using modern laser distance sensors is a better technique for no-fly zones. This technique, when integrated properly, provides almost infinite adjustment and can easily be configured for your needs.

Implementation of such a system requires monitoring the position of the bridge relative to the runway end stop or a wall and the trolley relative to the end of the bridge. It is imperative that you never lose position during operation. That is where Crane Sentry® Zone Manager products really shine.

We use long range laser distance sensors with absolute monitoring capability. Even if the laser signal is blocked or moves on/off its target plate for a brief moment, the position sensors will pick up its absolute position right away.

CONSIDERATIONS

Design & Implementation

Design and Implementation Considerations for No-Fly Zone Systems

When considering a restricted zoning system for your overhead crane, it is important to understand how your crane is utilized and to identify if the goal is personnel protection only or a combination of safety and equipment reliability.

- ➔ In what areas is the hoist prohibited?
- ➔ Is the no-fly zone(s) permanent or do you need access to this area at times for activity, such as machine maintenance?
- ➔ Are there obstacles that interfere with the crane's hoist or bridge intermittently that need protection, like a robotic arm, or a mast from a CNC machine?
- ➔ Do you need override capability over the restricted areas?
- ➔ Are there areas of your facility that the crane must always enter, but you need a SLOW zone instead of a no-fly zone?
- ➔ How many restricted zones are needed?

Other parameters that are crucial to the project:

- ➔ Runway length and span
- ➔ Type of crane drive... contactor, VFD, 250 VDC controls
- ➔ How many independent trolley hoists are on each crane?
- ➔ Radio controls or pendant controls



Off-the-Shelf Pre-Engineered Solutions for Overhead Crane No-Fly Zones



Next Generation Crane Sentry® Zone Manager II

Laser-View Technologies' next generation Crane Sentry® Zone Manager II is made especially for advanced no-fly zoning with overhead cranes. This product is an advancement on the popular Zone Manager system that has already set the bar in the overhead crane industry for no-fly zoning. The new product improves on the expandable capabilities of the system and permits remote configuration via a smartphone or tablet, while still providing controls on board. Zone Manager is considered a "field mod" for crane dealers, as it is easily retrofitted to existing cranes.

Crane Sentry® Zone Manager II provides systems that use long range laser distance sensors in 2 axes capable of measuring up to 500 meters. This technology provides an absolute position that does not require mechanical positioning of limit switches or re-zeroing of encoders.

Crane Sentry® Zone Manager provides an off-the-shelf system for keeping EOT cranes from interfering with structures or equipment under a crane runway. Crane Sentry® provides highly configurable systems that can prevent accidental damage to in-plant building or machinery by creating no-fly zones around each area.

With the Zone Manager, a virtual box is made around the restricted zone using (2) laser sensor axis. Zone Manager provides intuitive configuration, is easy to install, and provides everything you need as a package.

Accidental interference can lead to several problems:

- ➔ Injury to personnel
- ➔ Damage to structure
- ➔ Damage to tooling or materials being transported
- ➔ Downtime to evaluate the incident

Crane Sentry® Zone Manager has the following key advantages over the competition

- ➔ Up to 8 zones in one 2 axis system
- ➔ Controls are housed in its own enclosure, ready to mount; remote access available through a smart device with no internet connection needed
- ➔ Up to 500 meters of measurement range
- ➔ No reflector required for shorter runways
- ➔ Visible red eye safe laser spot
- ➔ This heart of our system is a robust measuring device and is not treated as a proximity sensor – you read a live value and teach/enter actual set points to determine zone perimeter
- ➔ Live error handling algorithm
- ➔ Built in override function

Important Key Characteristics to Consider

To maintain safe operation of hoists, it is important that a no-fly zone system have key characteristics that will promote safety and reliability:

- Absolute positioning sensors that never lose track of the crane and never require re-zeroing
- Configuration of zones and related slow buffers: Simple configuration of restricted zones and the related parameters. It is imperative that a slow and stop zone be configurable.
- User alarm configuration: The ability to set alarm limits is crucial.
- Interface with machines in your facility: The ability to override a no-fly zone or alert a machine that the crane is in its area.
- Override capability: Overrides are often needed for maintenance access with the crane
- Real measurement system: See the position values and don't guess like a proximity system

Results of implementing no-fly zone monitoring on your overhead crane(s):

When you invest in a Crane Sentry® Zone Manager, you are doing this to minimize the possibility of an accident and minimize the frequency of repairs and related down-time. You should have several expectations:

- Limit the ability of an operator to collide with obstructions in areas that have been preconfigured as known as restricted zones.
- Adjust operator behavior and awareness so that they transport materials in safe and clear paths
- Promote the modification of production processes in line with safe hoist practices.



Conclusion

As production demands increase, fast and efficient movement of materials via overhead cranes is important. Handling materials around structures and equipment in a facility poses an inherent risk to navigate the obstacles. Experienced operators typically can navigate around the building or stamping press in the middle of the runway, but it takes only the smallest distraction for an accident to occur. Any accident involving collision between a crane and a structure or machine can cause a reportable safety event, combined with serious machine or load damage. Investing in reliable and simple technology, such as Crane Sentry® Zone Manager can help in the quest to provide a safer interface with cranes that also minimizes unplanned downtime.